UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,737	06/19/2006	Kazushi Yamanaka	278810US2X PCT	8351

22850 7590 01/25/2011

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
SAKELARIS, SALLY A	
ART UNIT	**PAPER NUMBER**
1773	

NOTIFICATION DATE	DELIVERY MODE
01/25/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary	Application No.	Applicant(s)	
	10/550,737	YAMANAKA ET AL.	
	Examiner	Art Unit	
	SALLY A. SAKELARIS	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *10-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 20-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment filed 11/30/2010 has been received and considered for examination. Claims 1-27 remain pending; claims 10-19 have been withdrawn from consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 1-3 and 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukahara et al. (US 6566787) in view of Nobutaka (JP 2002-026688 Translation attached).

With regard to claim 1, Tsukahara et al. teach a sensor head, comprising:

a three-dimensional base body (Figure 1, (10)) having a curved surface allowing definition of a circular orbital band (12b);

an interdigital ((14c) comb like Col. 3 lines20-49) electroacoustic transducer (14) arranged on the orbital band of the three-dimensional base body, configured to excite surface acoustic wave to perform multiple roundtrips along the orbital band; and

a sensitive film (14a) capable of being gas permeable (Col. 10 lines 54-57) at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body, and capable of changing its surface acoustic wave characteristic in order to react with a specific gas molecule (Figures 1 and Col. 10 lines 54-57 teaching of a biosensor).

Wherein the (interdigital transducer (14c) is capable of converting the surface acoustic wave orbiting along the orbital band into a high frequency electric signal further capable of detecting the change in the propagation characteristic (i.e., see claim 2 and Col. 11 lines 23-28's teaching).

With regard to claim 2, Tsukahara teach the orbital band is defined on the surface of the outer periphery of the three-dimensional base body (Figure 1).

With regard to claim 3, Tsukahara teach the orbital band is defined on the interior face of a cavity of the three-dimensional base body (Figure 6, barreled cavity 61 with inner surface including 12c).

With regard to claims 20 and 21, which contain intended use terms, the Examiner will interpret these claims in light of the structural elements that are disclosed and not for their intended use as stated after the terms "used to" "converted by" "measured by". These terms and phrases are intended use terms. It has been held that a recitation with respect to the manner in

which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Exparte Masham, 2 USPQ2d 1647 (1987). The Examiner has applied references, which are capable of meeting these functions. A structure, which is capable of providing the intended use, is considered to meet the limitation of intended use recited in a claim to a device or an apparatus. Therefore, the structural recitations of an interdigital transducer (14) and a capability of being used as a gas sensor when a gas is flown into cavity (61) and a capability of being measured by the delay time is taught as an inherent part of Tsukahara's teachings (Col. 10, lines 54-58).

With regard to claim 22, Tsukahara teach their substrate (60) to be made of piezoelectric crystal material (Col. 11 lines 9-13).

With regard to claims 23 and 24, the electrostatic transducer is provided in an opening and is separate from a film (14a) in that it is provided on top of the film (Figure 1) and it is capable of being sensitive to gas (Claim 2, Col. 10, lines 54-58).

With regard to claims 25 and 26, the transducer is provided on the film (Col. 5 lines 20-25 for example) and the gas sensitive film is capable of being made from piezoelectric film (Col. 5 line 26).

With regard to claim 1, Tsukahara do not teach a necessarily gas sensitive film or a timing-controlled switching unit, or sensor head configured as claimed.

It should be noted that applicant's recitation of "and then…but before the SAW returns from a predetermined number of roundtrips" and "after the predetermined number of the plurality of roundtrips is calculated…characteristic" has been given the appropriate weight in light of its recitation of process steps or an intended use.

With regard to claims 1 and 27, Nobutaka teach a piezoelectric, gas sensitive film [0057] and [0061] as a part of their spherical surface acoustic device that includes a circuit as shown in drawing 5 [0053] that collectively is capable of performing the functions as claimed by the switching unit of claim 1. Nobutaka teach including the fluid perception sensor (40) that acts as a switching unit between input and output of the pulse signal generated by the impulse signal generator (44) that is inputted into the fluid perception sensor (40) via the circulator (41). Nobutaka further teach that the signal generated from the fluid perception sensor 40 is outputted to the oscilloscope 43 via amplifier 42 from the circulator 41. Nobutaka et al. teach that this switching unit is timing-controlled in that the input and output of the fluid sensor is measured as a function of time (i.e., MHz) [0053]. Lastly, Nobutaka et al. teach the sensor head configuration that is capable to output high frequency using a predetermined number of roundtrips as can be seen in [0034].

It would have been obvious for one of ordinary skill in the art at the time the invention was made to have used the circuit, its switching unit and various parts as taught by Nobutaka within the device of Tsukahara et al. as the use of SAW devices are well known in the art [0002] and further since Nobutaka et al. provide the motivation to do so in their teaching that their device will raise the accuracy of resonance frequency in a surface acoustic device by lessening propagation loss at the time of an elastic-surface wave spreading between electrodes as small as possible [0003].

With regard to claim 27, Tsukahara et al. in view of Nobutaka do not teach a second interdigital transducer capable of converting the surface acoustic wave orbiting along the orbital band into a high frequency electric signal so as to detect the change in the propagation

characteristic. However duplicating the same part by including a second transducer would have been obvious to one having ordinary skill in the art at the time the invention was made. Mere **duplication of parts** has no patentable significance unless a new and unexpected result is produced. In re Harza, 124 USPQ 378, 380 (CCPA 1960). Further, it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8.

2. Claims 4-7 are rejected under 103(a) as being unpatentable over Tsukahara et al.(US 6566787) in view of Nobutaka (JP 2002-026688 Translation attached) and in further view of Tom (US 6029500).

With regard to claims 4-7 Tsukahara et al. in view of Nobutaka teach that the piezoelectric, film provided at a predetermined position on the out surface can be prepared by all the currently known methods Tsukahara et al.(Col. 11 lines 1-3).

With regard to claims 5 and 6 Tsukahara teach respectively that the thickness of the sensor head film is $1/500^{th}$ and $1/1000^{th}$ of the wavelength of the surface acoustic wave or less. Tsukahara teach that the wavelength (λ) of the surface acoustic wave to be between 100-800 μm (Col. 3 line 53). Using λ =100 μm as the most stringent pole of the range, one five hundredth of 100 μm is 0.2 μm (200nm). One thousandth of 100μm is 0.1 μm (100nm).

Tsukahara et al. in view of Nobutaka do not teach the film to have any particular thickness and does not teach that the film consists of palladium.

Tom teaches a piezoelectric quartz crystal hydrogen surface acoustic wave device sensor having a thin film of the thickness of 100nm coating thereon of a hydrogen-interactive metal such as palladium (Abstract and Fig.1).

Therefore, with regard to claim 5 and 6, Tom teach a thickness of the thin film that is $1/500^{th}$ and $1/1000^{th}$ of the wavelength of the surface acoustic wave since 100 nm in film thickness is equal to or less than $\lambda/500 = 200nm$ and $\lambda/1000 = 100nm$.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to choose a Pd composition and such a thickness for the thin film, since Tom teaches that such a composed sensor "relates to a high sensitivity, high selectivity hydrogen gas sensor that is usefully employed in environments including those that have posed difficulties previously such as those containing other oxidizing species as well as in inert gases"(Col. 1 lines 48-53).

3. Claims 8 and 9 are rejected under 103(a) as being unpatentable over Tsukahara et al.(US 6566787) in view of Nobutaka (JP 2002-026688 Translation attached) and in further view of Bartley et al. (US 6060692).

Tsukahara et al. in view of Nobutaka do not teach a temperature sensor or resistive heating element on their SAW sphere transducer.

Bartley et al. teach a low power compact resistive heater (18) and sensor (Not shown but referenced in Col. 5 line 4) for piezoelectric devices (Figure 3).

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to choose to add the sensor and resistance detection pattern of Tom to the

spherical SAW device of Tsukahara in view of Nobutaka for the expected benefit that the Tom device does not require special processing and maintains its inherent performance and frequency stability therefore not having a size or cost penalty (Col. 2 lines 5-11).

Response to Arguments

Applicant's arguments filed 11/30/2010 have been fully considered but they are not persuasive.

Applicant first summarizes their amendments and their interpretation of that which is taught by the cited prior art in their pages 11-15. Next, applicant asserts:

> Thus, no matter how the teachings of the '787 and '688 patents are combined, the combination does not teach or suggest an interdigital electroacoustic transducer being connected to a timing-controlled switching circuit disposed outside of the sensor head, wherein the timing controlled switching circuit is configured to switch between an external high frequency generator and an external detection/output unit so that the timing controlled switching unit is configured to transfer high frequency electric signal from the external high frequency generator to the interdigital transducer, as recited in amended Claim 1. Further, the combined teachings of the '787 and '688 patents fail to disclose that the sensor head is configured to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips is calculated by the external detection/output unit, the delay time being generated by the change in the propagation characteristic, as recited in amended Claim 1.

In response, it is the position of the examiner, as can be seen from the rejections above that have been re-written to address the newly recited limitations of the claims, that the device of Tsukahara et al.(US 6566787) in view of Nobutaka (JP 2002-026688 Translation attached) is capable of performing the functions of the sensor head as is presently claimed. The applicant is reminded that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the

claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

In this case, the applicant will benefit from claiming the structural components of their device in more detail rather than the intended uses of these devices.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sally A. Sakelaris whose telephone number is 5712726297. The examiner can normally be reached on Monday-Friday 8-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 5712721267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sally A Sakelaris/

Examiner, Art Unit 1773

1/19/2011